

AMENDMENTS TO THE CLAIMS

1. (Currently amended) In a communications network, a method of verifying connectivity between a first node and one or more network nodes, comprising:
providing indications of elapsed periodic time intervals at the first node,
transmitting a first link integrity indication frame to the one or more network nodes, the first link integrity indication frame including a source identifier that uniquely identifies the first node;

~~counting elapsed periodic time intervals~~ interval indications subsequent to ~~since transmission of a~~ the transmitting of the first link integrity indication frame to produce a count for the first node, the link integrity indication frame being a frame which, when transmitted by the first node, can be received by the one or more network nodes on the communications network and which contains a source identifier that uniquely identifies the first node;

receiving frames from the one or more network nodes and ~~maintaining~~ maintaining, during each periodic time ~~interval~~ interval, a node state status and a current received frame source identifiers identifier;

determining the node state status upon the expiration of a predetermined elapsed time based on the count for the first node; and

~~transmitting the~~ a second link integrity indication frame based upon determining the node state status as ~~not being indicative of~~ not having received frames from a plurality of the ~~one or more network nodes during the predetermined elapsed time interval; and~~

resetting the count for the first node as a result of wherein, when transmitted, transmitting the second link integrity indication frame resets the count of each of the first node and the one or more network nodes.

2. (Original) The method of Claim 1, wherein the source identifier is a source address and the current received frame source identifier is a current received frame source address.

3. (Currently amended) The method of Claim 2, wherein counting the elapsed periodic time intervals includes:

incrementing a counter every time a an indication of a periodic time interval elapses elapsing occurs and the first node has not sent the second link integrity indication frame during the elapsed periodic time interval, and

resetting the counter whenever the first node transmits the second link integrity indication frame.

4. (Currently amended) The method of Claim 2, wherein maintaining a node state status includes:

establishing a node initial state status upon receipt of a frame from the one or more network nodes;

upon receiving a subsequent frame within the predetermined elapsed ~~time interval~~, time, comparing the current received frame source address with a subsequent frame source address, and

if the comparing indicates a same source address, the node state status remains unchanged, and

if the comparing indicates a different source address, the node state status changes to being indicative of having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed ~~time interval~~ and transmitting the second link integrity indication frame is suppressed.

5. (Currently amended) The method of Claim 2, wherein determining the node state status as ~~not~~ being indicative of not having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed ~~time interval~~ includes providing a logic state machine having a plurality of states including a down state indicative of a non-functional network link and a plurality of up states indicative of functional network links, the states being transitional therebetween based upon predetermined network node status, expiration of periodic timing intervals and receipt of frames by the first node.

6. (Original) The method of Claim 2, wherein maintaining a current received frame source address includes recording the current received frame source address in a memory table.

7. (Previously Presented) The method of Claim 2, wherein the first node is a node on a broadcast network.

8. (Previously Presented) The method of Claim 2, wherein the first node is a node on a point-to-point network.

9. (Original) The method of Claim 2, wherein the communication network is a multi-layer protocol communication network.

10. (Currently amended) The method of Claim 9, wherein ~~the transmitting of the first and second link integrity indication frame-frames is performed at~~ accomplished using a data link layer of the multi-layer protocol communication network.

11. (Currently amended) The method of Claim 2, wherein the first node and the one or more network nodes whose connectivity is being verified are connected ~~by using a transmission medium selected from the group of a telephone wire, a shielded twisted pair, an unshielded twisted pair, a cable, a power line, an optical fiber, or and a wireless medium.~~

12. (Currently amended) In a communications network, a link integrity apparatus for verifying connectivity between a first node and one or more network nodes communicating over a transmission medium, comprising:

a periodic time interval generator, which is adapted to provide indications of elapsed periodic time intervals;

a counter system for counting elapsed periodic time ~~intervals since interval indications subsequent to~~ transmission of a first link integrity indication frame to produce a count for the first node, wherein the first link integrity indication frame being a frame which, when transmitted by the first node, can be received by is provided, by the first node, to the one or more network

~~nodes on the communications network and which contains~~ nodes, the first link integrity indication frame including a source identifier that uniquely identifies the first node;

a receiver coupled to the transmission medium for receiving frames from the one or more network nodes;

a storage system for ~~maintaining~~ maintaining, during each periodic time ~~interval~~ interval, a node state status and ~~a current received frame source identifiers~~ identifier;

logic circuitry coupled to the counter system, the storage system and the receiver, the logic circuitry determining the node state status upon the expiration of a predetermined elapsed time ~~interval~~ a count of the periodic elapsed time intervals since transmission of the link integrity indication frame based on the count for the first node; and

a transmitter coupled to the logic circuitry and the transmission medium for transmitting the second link integrity indication frame over the transmission medium based upon ~~determining~~ by determining, using the logic circuitry, that the node state status as ~~not~~ being indicative of not having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed time ~~interval~~;

wherein, ~~when transmitted,~~ transmitting the second link integrity indication frame resets the count of each of for the first node ~~and the one or more network nodes~~.

13. (Currently amended) The link integrity apparatus of Claim 12, wherein the source identifier is a source address and the current received frame source identifier is a current received frame source address.

14. (Currently amended) The link integrity apparatus of Claim 13, wherein the ~~counter~~ count for the first node is incremented by the logic circuitry every time an indication of elapsed periodic time interval ~~expires~~ occurs and the first node has not sent the second link integrity indication frame during the elapsed periodic time interval, and the ~~counter~~ count is reset whenever the first node transmits the second link integrity indication frame.

15. (Currently amended) The link integrity apparatus of Claim 13, wherein the logic circuitry maintains node state status by:

establishing a node initial state status upon receipt of a frame from the one or more network nodes;

upon receiving a subsequent frame within the predetermined elapsed ~~time interval~~time, comparing the current received frame source address with a subsequent frame source address, and

if the comparing indicates a same source address, the node state status remains unchanged, and

if the comparing indicates a different source address, the node state status changes to being indicative of having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed time interval and transmitting the second link integrity indication frame is suppressed.

16. (Currently Amended) The link integrity apparatus of Claim 13, wherein the logic circuitry functions as a logic state machine having a plurality of states including a down state indicative of a non-functional network link and a plurality of up states indicative of functional network links, the states being transitional therebetween based upon a predetermined network node status, ~~expiration of elapsed~~ periodic ~~timing~~time intervals and receipt of frames by the first node.

17. (Currently amended) The link integrity apparatus of Claim 13, wherein the memory storage system includes a memory table for maintaining ~~a~~ the current received frame source address.

18. (Previously Presented) The link integrity apparatus of Claim 13, wherein the first node is a node on a broadcast network.

19. (Previously Presented) The link integrity apparatus of Claim 13, wherein the first node is a node on a point-to-point network.

20. (Original) The link integrity apparatus of Claim 13, wherein the communication network is a multi-layer protocol communication network.

21. (Currently amended) The link integrity apparatus of Claim 20, wherein the transmitting the first and second link integrity indication frame-frames is performed at a data link layer of the multi-layer protocol communication network.

22. (Currently amended) The link integrity apparatus of Claim 13, wherein the first node and the one or more network nodes whose connectivity is being verified are connected by using a transmission medium selected from the group of a telephone wire, a shielded twisted pair, an unshielded twisted pair, a cable, a power line, an optical fiber, or and a wireless medium.

Claims 23-42 (Canceled).

43. (Currently amended) In a communications network, a method of verifying connectivity between a first node and one or more network nodes, comprising:

providing indications of elapsed periodic time intervals;

transmitting a first link integrity indication frame to the one or more network nodes, the first link integrity indication frame including a source identifier that uniquely identifies the first node;

counting elapsed periodic time intervals since subsequent to the transmission-transmitting of a the first link integrity indication frame to produce a count; ~~the link integrity indication frame being a frame which, when transmitted by the first node, can be received by the one or more network nodes on the communications network and which contains a source identifier that uniquely identifies the first node;~~

receiving frames from the one or more network nodes and ~~maintaining-maintaining,~~ during each periodic time ~~interval-interval,~~ a node state status and a current received frame source-identifiers identifier;

upon the expiration of a predetermined elapsed ~~time~~time based on the count, interval determining the node state status and ~~a the count of the elapsed periodic time intervals since transmission of the link integrity indication frame;~~ and

transmitting the second link integrity indication frame based upon determining:

the node state status as being indicative of not having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed time interval, and

the count of ~~predetermined elapsed time intervals as being~~ is greater than a predefined count limit; and

resetting the count as a result of wherein, when transmitted, transmitting the second link integrity indication frame ~~resets the count of each of the first node and the one or more network nodes on the communications network.~~

44. (Previously Presented) The method of Claim 43, wherein the source identifier is a source address and the current received frame source identifier is a current received frame source address.

45. (Currently amended) The method of Claim 44, wherein counting the elapsed periodic time intervals includes:

incrementing a counter every time a an indication of a periodic time interval elapses ~~elapsing occurs~~ and the first node has not sent the second link integrity indication frame during the elapsed periodic time interval, and

resetting the counter whenever the first node transmits the second link integrity indication frame.

46. (Currently amended) The method of Claim 44, wherein maintaining a node state status includes:

establishing a node initial state status upon receipt of a frame from the one or more network nodes;

upon receiving a subsequent frame within the predetermined elapsed ~~time interval~~, time, comparing the current received frame source address with a subsequent frame source address, and

if the comparing indicates a same source address, the node state status remains unchanged, and

if the comparing indicates a different source address, the node ~~states~~ state status changes to being indicative of having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed ~~time interval~~ and transmitting the second link integrity indication frame is suppressed.

47. (Currently amended) The method of Claim 44, wherein determining the node state status as ~~not~~ being indicative of not having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed ~~time interval~~ includes providing a logic state machine having a plurality of states including a down state indicative of a non-functional network link and a plurality of up states indicative of functional network links, the states being transitional therebetween based upon a predetermined network node status, ~~expiration the~~ indications of the elapsed periodic timing time intervals and receipt of frames by the first node.

48. (Previously Presented) The method of Claim 44, wherein maintaining a current received frame source address includes recording the current received frame source address in a memory table.

49. (Previously Presented) The method of Claim 44, wherein the first node is a node on a broadcast network.

50. (Previously Presented) The method of Claim 44, wherein the first node is a node on a point-to-point network.

51. (Previously Presented) The method of Claim 44, wherein the communication network is a multi-layer protocol communication network.

52. (Currently amended) The method of Claim 51, wherein ~~the transmitting of the first and second link integrity indication frame frames is performed at~~ accomplished using a data link layer of the multi-layer protocol communication network.

53. (Currently amended) The method of Claim 44, wherein the first node and the one or more network nodes whose connectivity is being verified are connected by a transmission medium selected from the group of a telephone wire, a shielded twisted pair, an unshielded twisted pair, a cable, a power line, an optical fiber, or and a wireless medium.

54. (Currently amended) In a communications network, a link integrity apparatus for verifying connectivity between a first node and one or more network nodes communicating over a transmission medium, comprising:

a periodic time interval generator, which is adapted to provide indications of elapsed periodic time intervals;

a counter system for counting the indication of the elapsed periodic time intervals since subsequent to transmission of a first link integrity indication frame to produce a count for the first node, wherein the first link integrity indication frame being a frame which, when transmitted is provided, by the first node, to can be received by the one or more network nodes on the communications network and which contains nodes, the first link integrity indication frame including a source identifier that uniquely identifies the first node;

a receiver coupled to the transmission medium for receiving frames from the one or more network nodes;

a storage system for ~~maintaining~~ maintaining, during each periodic time interval interval, a node state status and a current received frame source identifiers address;

logic circuitry coupled to the counter system, the storage system and the receiver, wherein the logic circuitry circuitry, upon the expiration of a predetermined elapsed time interval based on the count, determining determines the node state status and a the count of the periodic elapsed time intervals since transmission of the link integrity indication frame; and

a transmitter coupled to the logic circuitry and the transmission medium for transmitting the second link integrity indication frame over the transmission medium based upon the logic

~~circuitry determining by the logic circuitry that~~ (i) ~~the node state status as being~~ is indicative of ~~not~~ having received frames from a plurality of the ~~one or more~~ network nodes during the ~~predetermined elapsed time interval, time and~~ (ii) ~~the count for the first node of predetermined elapsed time intervals as being~~ is greater than a predefined count ~~limit; limit,~~ wherein, ~~when transmitted, transmitting the second link integrity indication frame resets the count of each of for~~ the first node ~~and the one or more network nodes on the communications network.~~

55. (Currently amended) The link integrity apparatus of Claim 54, wherein the source identifier is a source address and the current received frame source identifier is a current received frame source address.

56. (Currently amended) The link integrity apparatus of Claim 55, wherein the ~~counter count for the first node~~ is incremented by the logic circuitry every time an indication of an elapsed periodic time interval expires occurs and the first node has not sent the second link integrity indication frame during the elapsed periodic time interval, and the ~~counter count for the first node~~ is reset whenever the first node transmits the second link integrity indication frame.

57. (Currently amended) The link integrity apparatus of Claim 55, wherein the logic circuitry maintains the node state status by:

establishing a node initial state status upon receipt of a frame from the one or more network nodes;

upon receiving a subsequent frame within the predetermined elapsed time interval, comparing the current received frame source address with a subsequent frame source address, and

if the comparing indicates a same source address, the node state status remains unchanged, and

if the comparing indicates a different source address, the node state status changes to being indicative of having received frames from a plurality of the ~~one or more~~ network nodes during the predetermined elapsed time ~~interval~~ and transmitting the second link integrity indication frame is suppressed.

58. (Currently Amended) The link integrity apparatus of Claim 55, wherein the logic circuitry functions as a logic state machine having a plurality of states including a down state indicative of a non-functional network link and a plurality of up states indicative of functional network links, the states being transitional therebetween based upon ~~predetermined~~ the network node status, expiration of periodic timing intervals and receipt of frames by the first node.

59. (Currently amended) The link integrity apparatus of Claim 55, wherein the memory storage system includes a memory table for maintaining ~~a~~ the current received frame source address.

60. (Previously Presented) The link integrity apparatus of Claim 55, wherein the first node is a node on a broadcast network.

61. (Previously Presented) The link integrity apparatus of Claim 55, wherein the first node is a node on a point-to-point network.

62. (Previously Presented) The link integrity apparatus of Claim 55, wherein the communication network is a multi-layer protocol communication network.

63. (Currently amended) The link integrity apparatus of Claim 62, wherein ~~the~~ transmitting the first and second link integrity indication frames is performed at a data link layer of the multi-layer protocol communication network.

64. (Currently amended) The link integrity apparatus of Claim 55, wherein the first node and the one or more network nodes whose connectivity is being verified are connected by a transmission medium selected from ~~the group of~~ a telephone wire, a shielded twisted pair, an unshielded twisted pair, a cable, a power line, an optical fiber, ~~or~~ and a wireless medium.